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|-------------------------------|------------------------|---------------------|--|
| Notice of Allowability | Application No. | Applicant(s) | |
| | 10/722,972 | LIANG, GEORGE | |
| | Examiner | Art Unit | |
| | Igor Kershteyn | 3745 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☐ This communication is responsive to ____.
2. ☒ The allowed claim(s) is/are 1-17.
3. ☒ The drawings filed on 26 November 2003 are accepted by the Examiner.
4. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: ____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date ____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date ____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 5. <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 6. <input type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date ____. |
| 3. <input checked="" type="checkbox"/> Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date <u>11/26/2003</u> | 7. <input type="checkbox"/> Examiner's Amendment/Comment |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance |
| | 9. <input type="checkbox"/> Other ____. |

Reasons for allowance

The following is an examiner's statement of reasons for allowance:

The instant invention is deemed to be directed to an unobvious improvement to a turbine blade over U.S. Patent No. 6,164,917 which teaches a turbine blade 10, comprising: a generally elongated blade having a leading edge 28, a trailing edge 30, and a tip 34 at a first end, a root 12 coupled to the blade at an end generally opposite the first end for supporting the blade 10 and for coupling the blade to a disc, at least one cavity 18 forming a cooling system in the blade 10, and at least one outer wall 24 defining the at least one cavity 18 forming at least a portion of the cooling system, wherein the cooling system comprises at least one orifice 48 in the tip of the generally elongated blade providing a pathway from the at least one cavity 18 forming at least a portion of the cooling system through the at least one outer wall 24; at least one chamber 46 in the tip 34 of the generally elongated blade 10; and at least one film cooling hole 50 extending from the at least one chamber 46 to an outer surface of the generally elongated blade 10.

Regarding claim 1, the improvement comprises at least one vortex in a tip, and a plurality of metering slots extending between the at least one orifice and the at least one vortex chamber.

Regarding claim 10, the improvement comprises at least one vortex in a tip, the at least one vortex chamber has a generally rectangular cross-section with an outer

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corner, diagonal from a point at which a metering slot is attached, having an inside angle less than about 90 degrees.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Prior Art

Prior art made of record but not relied upon is considered pertinent to Applicant's disclosure and consist of five patents.

Andersen (4,142,824) is cited to show a turbine blade tip having an orifice communicating with an internal cavity, and a cooling hole but fails to teach a vortex chamber and a metering slots.

Phillips et al. (4,669,957) is cited to show a turbine blade having an orifice communicating with an internal cavity, a vortex chamber, and a plurality of film cooling holes, but fails to teach the orifice, the vortex chamber, and film cooling holes located at a tip of the blade.

Wagner (4,682,933) is cited to show a turbine blade tip having a vortex chamber in the tip, but fails to teach an orifice, a metering slot, and film cooling holes.

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Auxier (5,403,158) is cited to show a turbine blade tip having an orifice communicating with an internal cavity, and a cooling hole but fails to teach a vortex chamber and a metering slots.

Roeloffs (6,527,514) is cited to show a turbine blade tip having an orifice communicating with an internal cavity, and a cooling hole but fails to teach a vortex chamber and a metering slots.

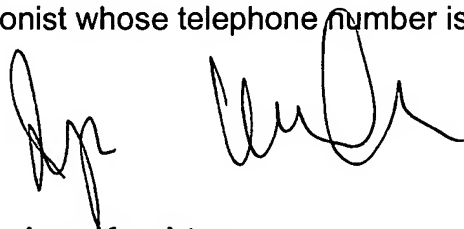
Contact information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Kershteyn whose telephone number is **(571)272-4817**. The examiner can be reached on Monday-Friday from 8:00 a.m. to 4:30 p.m.

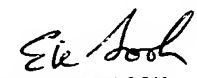
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Look, can be reached on **(571)272-4820**. The fax number is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308 0861.

IK
February 18, 2005



Igor Kershteyn
Patent examiner.
Art Unit 3745



EDWARD K. LOOK
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3700

2/18/05